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CALOSOTINAE AND NEANASTATINAE IN THE IBERIAN PENINSULA AND CANARY ISLANDS, WITH DESCRIPTIONS OF NEW SPECIES AND A SUPPLEMENTARY NOTE ON *BRASEMA* CAMERON, 1884 (HYMENOPTERA, CHALCIDOIDEA, EUPELMIDAE)

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ABSTRACT

Recognized as occurring in the Iberian Peninsula and Canary Islands are nine species of *Calosota*, seven species of *Eusandalum* and one species of *Pentacladia* in Calosotinae, and one species each of *Metapelma* and *Neanastatus* in Neanastatinae. Taxonomic and biological data, keys to species of *Calosota* and *Eusandulum*, and descriptions of two new species of *Calosota* are provided. The following new synonymies are proposed: *Calosota fumipennis* Bolívar under *C. aestivalis* Curtis, *C. lixobia* Erdös under *C. obscura* Ruschka, *C. matritensis* Bolívar and *C. modesta* Bolívar under *C. viridis* Masi. A supplementary note on *Brasema* (Eupelminae) in Spain is appended with *Brasema ephedricola* Askew synonymized under *Brasema stenus* (Boucek) (new combination).

Key words: Hymenoptera, Chalcidoidea, Eupelmidae, Calosotinae, Neanastatinae, *Brasema*, Spain, Canary Islands, new species.

RESUMEN

Calosotinae y Neanastatinae de la Península Ibérica e Islas Canarias, con descripción de nuevas especies y una nota suplementaria sobre *Brasema* Cameron, 1884 (Hymenoptera, Chalcidoidea, Eupelmidae)

Se revisan las especies de la Península Ibérica e Islas Canarias de las subfamilias Calosotinae y Neanastatinae (Eupelmidae). En Calosotinae se reconocen nueve especies de *Calosota*, siete de *Eusandalum* y una de *Pentacladia*, mientras que Neanastatinae incluye una especie de *Metapelma* y una de *Neanastatus*. Se aportan datos taxonómicos y biológicos, claves de identificación de las especies de *Calosota* y *Eusandalum*, y se describen dos especies nuevas para la ciencia de *Calosota*. Se proponen las siguientes sinonimias: *Calosota fumipennis* Bolívar con *C aestivalis* Curtis, *C. lixobia* Erdös con *C. obscura* Ruschka; *C. matritensis* Bolívar y *C. modesta* Bolívar con *C. viridis* Masi. Finalmente se añade una nota suplementaria sobre *Brasema* (Eupelminae) y *Brasema ephedricola* Askew se sinonimiza con *Brasema stenus* (Boucek) (combinación nueva).

Palabras clave: Hymenoptera, Chalcidoidea, Eupelmidae, Calosotinae, Neanastatinae, *Brasema*, España, Islas Canarias, especies nuevas

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Introduction

In two previous papers on the fauna of the chalcid family Eupelmidae in Spain and the Canary Islands (Askew & Nieves-Aldrey, 2000 & 2004) we considered species of the subfamily Eupelminae. The present paper deals with the subfamilies Calosotinae and Neanastatinae and, with further data on *Brasema* (Eupelminae), concludes our review of Spanish Eupelmidae.

Calosotinae and Neanastatinae show little sexual dimorphism in comparison to Eupelminae, and females appear to possess full flight capability, unlike those of Eupelminae which, even if macropterous, fly weakly and seldom, often by little more than wing-assisted jumping (Gibson, 1995).

Material housed in the Museo Nacional de Ciencias Naturales (Madrid) provides the basis for our work. This material includes specimens collected by Garcia Mercet, Bolívar y Pieltain and other Spanish entomologists working in the first half of the twentieth century, and was used by Bolívar in his published studies of Spanish species (Bolívar, 1923a, 1923b, 1926, 1929).

Ceballos (1956) catalogued 14 Spanish species of Calosotinae (eight under *Calosota*, six under *Polymoria*) but did not include any species now considered in Neanastatinae. With recent synonymies and additions, the Spanish faunal list remains at 14 Calosotinae (plus an unidentified *Calosota* species in the Canary Islands) and two Neanastatinae.

Taxa are arranged alphabetically and nomenclature follows Gibson (1995). The following abbreviations are used: JBZ = J. Blasco-Zumeta, JNA = J. L. Nieves-Aldrey, MNCN = Museo Nacional de Ciencias Naturales (Madrid), RGM = R. Garcia Mercet, RRA = R. R. Askew, ZMAN = Zoölogisch Museum Amsterdam, Nederland.

CALOSOTINAE

Calosota Curtis, 1836

Ruschka (1921) recognized only four European species of *Calosota*, but this number rose to eighteen (including some synonyms) in Hedqvist's (1956) key to palaearctic species. A substantial part of this increase resulted from the studies of Bolívar (1923b, 1929) who described five new species in a Spanish fauna of eight species. Here we propose the synonymy of three of Bolívar's names. The following key is to eight (possibly seven) Spanish species (two described as new) plus an unidentified species from the Canary Islands, and *Calosota acron* (Walker) is included, although it has not been found in Spain, because it shares some characters with *C. ariasi* Bolívar.

Key to species of *Calosota* Curtis

1 Female 2
• Male 10

2(1) Forewing with isolated bare strip (linea calva) behind parastigma and base of marginal vein; scutellum at base only about 1.5 times as broad as an axilla (fig. 18). [Ocelli in a slightly obtuse triangle with vertex in dorsal view much broader than an eye; scape yellow at base, sometimes very narrowly so; anellus 1.1-1.3 times as long as broad; reticulation of thoracic dorsum relatively coarse; metacoxa with femoral depression on outer face pilose; forewing with length of postmarginal vein 0.7 times marginal vein and about 1.9 times stigmal vein; gaster about 1.7 times as long as rest of body] ..... ***acron*** (Walker)

• Forewing without an isolated bare strip, usually evenly pilose, but sometimes with a bare area (speculum) (*viridis*), or a narrow bare strip against basal vein (*dusmeti*, some *obscura*) with pilosity beyond this less dense, occasionally pale and indistinct; scutellum at base broader, in most species 4-8 times maximum breadth of an axilla (fig. 17), but if narrower than this then postmarginal vein only 0.35 times as long as marginal vein (*viridis*) or scape entirely dark (*aestivalis*) 3

3(2) Head in dorsal view (fig. 10) with vertex (interocular distance) equal to breadth of an eye, POL about twice OOL..... 4

• Head in dorsal view (figs 11, 12) with vertex at least 1.3 times as broad as an eye, POL greater than twice OOL 5

4(3) Ocelli in a distinctly acute triangle (about 70º) (fig. 10); antennal anellus twice as long as broad (as fig. 5). [Pedicel plus flagellum 1.5-1.6 times as long as breadth of head]…… ..... ***vernalis*** Curtis

• Ocelli in a slightly obtuse triangle; antennal anellus about 1.3 times as long as broad ..... ***ariasi*** Bolívar

5(3) Antenna with pedicel plus flagellum 1.2-1.4 times as long as breadth of head, first to sixth (F1-6) funicle segments and anellus all at least slightly longer than broad, clava (when not collapsed) about 3.0 times as long as broad and about as long as F5-7 (figs 2, 4); forewing with pilosity dark and of even density distal to basal vein 6

• Antenna with pedicel plus flagellum at most only slightly (1.1 times) longer than breadth of head, F1-6 subquadrate or F1-4 very slightly longer than broad, anellus subquadrate or transverse, clava 2.0-2.5 times as long as broad and about as long as F6-7 (except *viridis*); forewing sometimes with speculum or with hairs immediately distal to basal vein pale and relatively sparse 8

6(5) Vertex and frons relatively dull with quite strongly raised reticulate sculpture, vertex mostly blue-green outside ocellar triangle, frons mostly coppery to purple with a bluish spot below anterior ocellus and usually a blue-green stripe on inner orbit; mesoscutum blue-green with at least some indication of two broad, coppery to purple, submedian, longitudinal stripes; propodeum medially extremely short, much shorter than transverse diameter of propodeal spiracle; post-cercal part of last gastral tergite about 1.7 times longer than broad; body length 3.5-7.0 mm. [Marginal vein 2.7-3.1 times as long as stigmal vein] ..... ***aestivalis*** Curtis

• Vertex and frons shiny, partly smooth with hair-pits and some hardly raised reticulate sculpture, vertex and frons almost entirely dark greenish to bluish black; mesoscutum rather uniformly coloured without longitudinal stripes; propodeum medially at least as long as propodeal spiracle; post-cercal part of last gastral tergite not or slightly (1.0-1.3 times) longer than broad; body length 1.8-2.8 mm 7

7(6) Toruli entirely below lower ocular line (fig. 3); forewing marginal vein 3.5-5.2 times as long as stigmal vein; metacoxa with femoral depression on outer face ill-defined and entirely pilose (fig. 14); body length 1.8-1.9 mm ..... ***nitens*** sp. n.

• Toruli somewhat higher, the lower ocular line passing just above their centres (fig. 1); forewing marginal vein 2.8-3.2 times as long as stigmal vein; metacoxa with femoral depression clearly defined and bare (fig. 13); body length 2.8 mm ..... ***bolivari*** sp. n.

8(5) Forewing with a speculum and clear with pale venation; antennal flagellum strongly clavate with clava twice the breadth of last funicle segment (F7) and longer than combined length of F5-F7; body green to blue-green, sometimes with violet tints; 'knees' and apices of tibiae broadly yellow; ocelli in an acute-angled triangle (about 75º); base of scutellum 3.5-4.0 times as broad as an axilla; mesopleuron with weak sculpture, partly smooth and shiny; body length 1.6-2.8 mm ..... ***viridis*** Masi

• Forewing without a speculum (although pilosity immediately distad to basal vein sometimes pale and sparse) and usually slightly to quite strongly tinted brownish with brown venation; antennal flagellum only moderately clavate with clava distinctly less than twice breadth of F7 and about as long as combined length of F6 and F7; body dark green to blue-black; 'knees' and apices of tibiae more narrowly pale; ocelli in a slightly obtuse triangle (about 100º) (fig. 12); base of scutellum 6.0-8.0 times as broad as an axilla (fig. 17); mesopleuron relatively strongly reticulately sculptured, not shiny; body length 2.5-4.8 mm 9

9(8) Antennal scape entirely dark; metafemur and metatibia black or slightly paler only at extreme apices ..... ***obscura*** Ruschka

• Antennal scape yellowish brown at base or darkened only at apex; metafemur with apical quarter to half pale brown, metatibia mostly pale brown ..... ***dusmeti*** Bolívar

10(1) Antennal funicle segments (fig. 8) separated by short petioles, the petioles between distal funicle segments about half as long as body of segment; funicle segments each bearing two whorls of long setae about as long as respective segment; pedicel plus flagellum 1.6 times as long as breadth of head ..... **sp. indet.**

• Antennal funicle segments not or inconspicuously petiolate, each with relatively short hairs; pedicel plus flagellum at most 1.35 times as long as breadth of head 11

11(10) Antenna (fig. 5) with funicle segments all narrower than pedicel, F1 2.0 times and F7 about 1.5 times as long as broad; ocelli in an acute triangle .....***vernalis***
[The unknown male of *C. nitens* may have the antennal characters of *C. vernalis* but the ocellar triangle should be slightly obtuse]

• Antenna with at least distal funicle segments not narrower than pedicel, F1 shorter than 2.0 times as long as broad, often subquadrate and about as long as F7; ocelli in a right-angled to slightly obtuse triangle 12

12(11) Forewing with speculum and indistinct white pilosity, clear with pale venation; antennal funicle compact, its segments not separated; 'knees', tibial apices and meso- and metatarsi quite broadly yellow. [F1 slightly narrower and shorter than following segments (fig. 7); gaster strongly laterally compressed in air-dried specimens; ocellar triangle right-angled] ..... ***viridis***

• Forewing without speculum although sometimes with a bare strip and reduced pilosity distad to basal vein, pilosity mostly dark, venation dark, forewing often with a brownish tint; antennal funicle sometimes with segments slightly separated; 'knees', tibial apices and meso- and metatarsi with reduced pale markings and these often brownish 13

13(12) Antennal funicle (fig. 9) stout, its segments subquadrate to slightly longer than broad, slightly separated and with dense outstanding curved hairs; anellus transverse; F1 as broad as pedicel and F2-F7 distinctly broader than pedicel; ocellar triangle slightly obtuse; mesoscutum without coloured stripes; gaster not strongly dorso-ventrally flattened in air-dried specimens ……. ..... ***obscura***

• Antennal funicle (fig. 6) less stout, its segments longer, F2-F4(5) distinctly longer than broad, compact and with less outstanding straight hairs; anellus as long as or longer than broad; F1 narrower than pedicel and F2-F7 not or only slightly broader than pedicel; ocellar triangle slightly acute; mesoscutum usually with submedian longitudinal stripes of contrasting colour; gaster usually strongly flattened dorso-ventrally with a ventral plica in air-dried specimens ..... ***aestivalis***

Calosota aestivalis Curtis, 1836

Calosota aestivalis Curtis, 1836: 596
Calosoter vernalis Walker, 1837: 359
Calosota fumipennis Bolívar, 1923b: 65-67 **syn. n.**
Calosota vernalis Curtis; Bolívar, 1929: 128-129 (misidentification)

The correct application of the names *Calosota aestivalis* Curtis and *Calosota vernalis* Curtis, pre-

viously confused by Walker (1837) and subsequent authors, was established by Graham (1969).

Calosota aestivalis was recorded from Spain under the name *C. vernalis* from a single male, now in MNCN, taken in 1923 in Segovia (Bolívar, 1929). Askew *et al.* (2001) reported its presence in Zaragoza. Further material in MNCN comes from Madrid, including a male labelled 'Villaviciosa 15.3.27 Agrilus derasofasc. Col. G$^{A.}$ Mercet', indicating that it was associated with Buprestidae (Coleoptera).

Calosota fumipennis is a large, dark-winged form of *C. aestivalis*. The female holotype (MNCN), labelled as such by Bolívar, is missing the gaster, and the left antenna is still enclosed in pupal casing. It is the only specimen Bolívar had before him when describing *C. fumipennis*, and it was reared by M. M. de la Escalera, purportedly from a nest of *Megachile* sp. (Hym., Apidae), in a *Rubus* stem collected in Madrid (Villaviciosa de Odón). It is unlikely that *Megachile* was the actual host of *C. fumipennis*; some Coleoptera larva inhabiting the *Rubus* stem is more probable.

In MNCN there are 1 ♀ and 2 ♂♂ *Calosota* labelled, respectively, '27452', '26233' and '28817'. The female is large (length 6.5 mm.) with some brownish infumation on the disc of the forewing, very similar to the holotype of *C. fumipennis*, but the males are indistinguishable from specimens attributed to *C. aestivalis* collected elsewhere. Outside Spain similar large females of *C. aestivalis* have been seen from France (Dordogne, Ste Alvère, 17.vi.2003, RRA), Poland (Radom, 8.vii.1998, on dead *Fagus* branch, M. Mikowski) and Hungary (Koszeg, Irottko National Park, 19.v.2001, on dead *Carpinus*, RRA). These differ from typical *C. aestivalis* only in their size, and it is concluded that *C. fumipennis* represents one extreme of a continuous size range in *C. aestivalis*. A large (body length almost 7 mm.) female *C. aestivalis* from Turkey (NE Tokat, Niksar, emerged 28.v.2001 from dead, beetle-infested *Quercus*, M. Rejzek) has almost clear wings.

Calosota ariasi Bolívar, 1929

Calosota ariasi Bolívar, 1929: 129-131

Calosota ariasi was described from a single female collected in Madrid by J. Arias (date not given). A micropin mount on a pith block in MNCN bears the printed labels 'Madrid, Arias', 'Colección G^{A}. Mercet' and a handwritten label 'Calosota ariasi. ♀ tipo', but the specimen itself has apparently been lost.

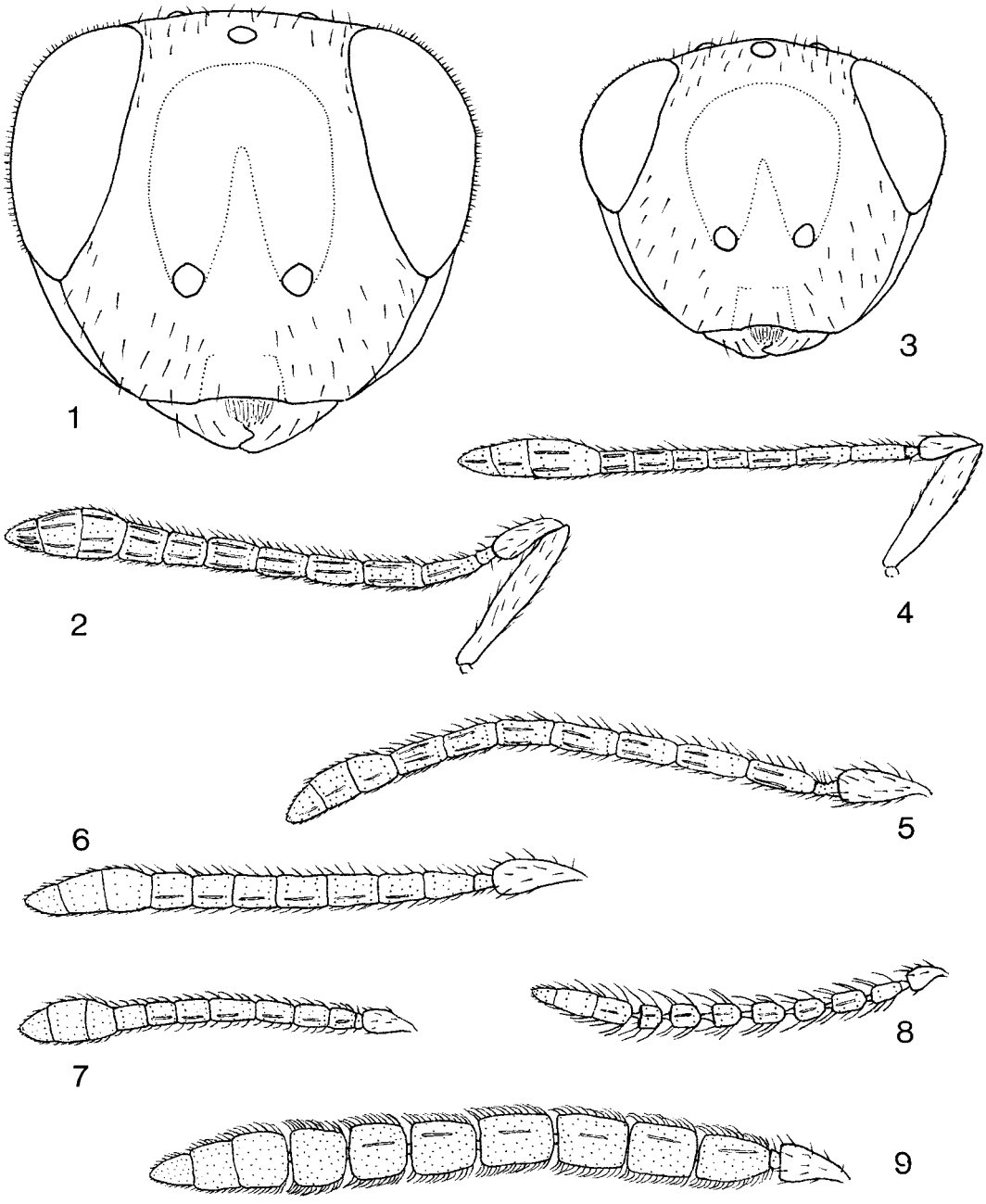
We have seen no specimen of Spanish provenance that agrees with Bolívar's description of *C. ariasi,* but some of the characters that he mentions suggest that *C. ariasi* might be a junior synonym of *Calosota acron* (Walker, 1848). British material of *C. acron* matches the description of *C. ariasi* in the form of the antenna, wing venation and shape of gaster, but differs in describing the interocular space as equal to the breadth of an eye (broader than an eye in *C. acron*), and the scutellum as narrow but five times (not more than four times in the key) as broad as an axilla. In *C. acron* the scutellar base is little more than 1.5 times the breadth of an axilla. A linea calva (isolated, oblique bare strip on the forewing, behind the parastigma and proximal part of marginal vein, directed towards the junction of the stigmal and marginal veins) distinguishes *C. acron* from other described species of *Calosota*, but there is no mention of this character in Bolívar's description of *C. ariasi*. Furthermore, the antennal scape and legs of *C. ariasi* are described as darker than we find in British specimens of *C. acron*. Because of these discrepancies we refrain from placing *C. ariasi* in synonymy with *C. acron*, and the issue remains unresolved pending the discovery of further Spanish material.

Calosota bolivari Askew **sp. n.** (figs 1, 2, 13)

MATERIAL: Holotype ♀. Spain, Madrid, El Ventorillo, Malaise trap, 14.vii.1991, A. Garrido. Deposited in MNCN. Paratype, 1 ♀. Spain, Madrid, El Pardo (El Goloso), Malaise trap, 1-8.vi.1991, Nieves & Rey leg. Deposited in coll. RRA.

FEMALE. Length 2.8 mm. Head with frons, vertex and occiput purple-black, outer orbit blue-green; antennal scape dark and weakly metallic. Pronotum mostly purple-black, somewhat greenish laterally; mesoscutum bluish green, more or less violet anteriorly; axillae and scutellum green, disc of scutellum coppery; mesopleuron anteriorly and prepectus purple-black, remainder of side of thorax blue-green. Propodeum blue-green. Forewing with faint brown infumation; venation brown; microtrichiae dark. Legs with coxae concolorous with thorax; femora dark and weakly metallic with only apices narrowly pale; tibiae dark brown with bases and apices brownish yellow; tarsi brown, meso- and metatarsi with basal one or two segments brownish yellow. Gaster with dorsum mostly purple-black, first tergite basally blue-green.

Head in dorsal view about twice as broad as long; eyes separated by about 0.4 times breadth of head; POL 1.8 times OOL, ocellar triangle right-



Figs 1-9.— 1-4: *Calosota* species. 1) *C. bolivari* sp. nov. ♀ holotype, head in front view; 2) *C. bolivari* ♀ left antenna; 3) *C. nitens* sp. nov. ♀ holotype, head in front view; 4) *C. nitens* ♀ left antenna. 5-9: left pedicel and flagellum ♂♂: 5) *C. vernalis* Curtis (from England); 6) *C. aestivalis* Curtis (Madrid); 7) *C. viridis* Masi (Granada); 8) *Calosota* sp. indet. (Tenerife); 9) *C. obscura* Ruschka (Zaragoza) (the specimen illustrated has F1 larger than average; normally it is shorter and more distinctly narrower than F2).

Figs 1-9.— 1-4: Especies de *Calosota.*1) *C. bolivari* sp. nov. ♀ holotipo, cabeza en visión frontal; 2) *C. bolivari* ♀ antena izquierda; 3) *C. nitens* sp. nov. ♀ holotipo, cabeza en visión frontal; 4) *C. nitens* ♀ antena izquierda. 5-9 pedicelo y flagelo izquierdo ♂♂: 5) *C. vernalis* Curtis (de Inglaterra); 6) *C. aestivalis* Curtis (Madrid); 7) *C. viridis* Masi (Granada); 8) *Calosota* sp. indet. (Tenerife); 9) *C. obscura* Ruschka (Zaragoza) (el ejemplar ilustrado tiene F1 más largo que la media; por lo general es más corto y claramente más estrecho que F2).

angled, posterior ocellus separated from orbit by rather more than its diameter; vertex shiny, the reticulate sculpture only very weakly raised and hair-pits discernible. Head in front view (fig. 1) about 1.2 times as broad as high; toruli centred at level of lower edge of eye; scrobes separated from anterior ocellus by about two ocellar diameters, scrobal area quite deeply excavated with a short, blunt intertorular crest and low, rounded parascrobal ridges. Antenna (fig. 2) with pedicel plus flagellum 1.25 times as long as breadth of head; scape about as long as transverse diameter of eye, about five times as long as broad, narrowed in basal third; pedicel almost three times as long as broad; anellus somewhat longer than broad; funicle with F1 not quite as broad as pedicel and 2.7 times as long as broad, F1 plus anellus about as long as pedicel, F2-5(6) longer than broad and F7(6) subquadrate, funicle segments becoming progressively slightly shorter and broader, with moderately outstanding setae (on middle segments setae not quite half as long as breadth of respective segments) and an irregular transverse row of relatively long sensilla (2 or 3 visible on each segment in lateral view); clava in dried specimens flattened, 2.2 times as long as broad and twice as broad as pedicel.

Mesoscutum 1.6 times as broad as long with strongly raised reticulate sculpture which is coarse in a broad median band; scutellum slightly broader than long, almost flat (distorted in holotype in which it is in same plane as dorsellum), its basal (anterior) margin about 4 times breadth of an axilla, reticulate sculpture finer than on mesoscutum with narrow, elongated areoles. Mesopleuron weakly sculptured anteriorly, almost smooth posteriorly. Mesotarsus with a double row of pale, ventral pegs on T1-4. Metacoxa (fig. 13) with femoral depression bare. Propodeum medially about as long as dorsellum, weakly sculptured and shining; spiracle shorter than median length of propodeum.

Forewing reaching base of last gastral tergite; pilosity short, of more or less even density anterior to cubital vein; ratio of lengths costal cell: marginal vein: stigmal vein: postmarginal vein as 36:30:10:15; stigmal vein forming an angle of about 35E with postmarginal vein.

Gaster (excluding ovipositor sheath) 1.8 times length of mesosoma, in dorsal view 2.4 times as long as broad; post-cercal part of last tergite 1.3 times as broad as long; ovipositor sheath protruding a distance equal to about 0.7 times post-cercal length of last tergite.

MALE. Unknown.

ETYMOLOGY. In commemoration of Dr C. Bolívar y Pieltain who made outstanding contributions to knowledge of Spanish Eupelmidae.

COMMENTS. The relatively long antennae (pedicel plus flagellum 1.25-1.30 times breadth of head), absence of any bare area on the forewing anterior to the cubital vein, and a right-angled to slightly acute ocellar triangle constitute a combination of characters shared with female *C. aestivalis* and, in part, *C. nitens* (see below). *Calosota bolivari* is distinguished from *C. aestivalis* primarily by its propodeum being as long as the dorsellum (much shorter than dorsellum in *C. aestivalis*), right-angled ocellar triangle and very weakly raised reticulate sculpture on the vertex and frons. It differs from *C. nitens* in the higher placement of the antennal toruli (fig. 1, *cf.* fig. 3) and the bare femoral depression on the outer face of the metacoxa (fig. 13).

An unidentified female *Calosota* (France, Lot et Garonne, Bernac, Malaise trap, vii.1995, R. R. Askew) is similar to *C. bolivari* because of weak head sculpture and an almost uniformly coloured mesoscutum, but in some other characters it approaches *C. aestivalis*, although the scape is basally pale.

Calosota dusmeti Bolívar, 1929

Calosota dusmeti Bolívar, 1929: 139-140

Calosota dusmeti was described from a single female from Madrid (Villalba) which is in MNCN. It is badly damaged, only the pinned mesosoma remaining and this lacks wings and legs beyond the coxae. It is labelled 'Calosota dusmeti tipo' in Bolívar's hand. As remarked by Bolívar (1929), the species is very near *C. obscura* and the colour characters distinguishing *C. dusmeti* and *C. obscura*, as indicated above in the key, appear to intergrade. It is possible that *C. dusmeti* is merely a colour variant of *C. obscura*. The male of *C. dusmeti* has not been recognized.

Calosota dusmeti was recorded from Zaragoza (1 ♀) by Askew *et al.* (2001), and additional material which we refer to *dusmeti* in MNCN is from Madrid (El Pardo, 2 ♀ ♀, 1927 and 1928, RGM; El Ventorrillo, 1 ♀, 14.vii.1991, A. Garrido; Montarco, 3 ♀ ♀, 1906 and 1907, Cabrera; Vaciamadrid, 1 ♀, 20.viii.2002, J. I. Lopez-Colon). Another female was taken in Toledo (Dosbarrios, 19.vii.1994, RRA).

Calosota nitens Askew **sp. n.** (figs 3, 4, 14)

MATERIAL: Holotype ♀. Spain, Madrid, El Pardo (El Goloso), Malaise trap, 9-16.vi.1991, Nieves and Rey. Deposited in MNCN. Paratypes, 2♀♀, same data as holotype except collected 17-23.vi.1991 and 1-8.vii.1991. Deposited in MNCN and coll. RRA.

FEMALE. Length 1.8 mm. Head dark green-black with bronze to purple tints; antennal scape entirely dark and metallic; pedicel and flagellum dark brown, the pedicel weakly metallic. Mesoscutum dark green with extensive coppery tints; scutellum and axillae mostly coppery; side of thorax green- to purple-black. Propodeum mostly blue-green. Forewing faintly brownish; venation pale brown; microtrichiae dark. Legs with coxae concolorous with thorax; femora dark, weakly metallic, apex of metafemur quite broadly pale brownish yellow, apices of pro- and mesofemora narrowly pale; tibiae with bases narrowly brownish yellow, medially brown, this region darkest basally shading to pale brownish yellow distally; tarsi mostly pale brownish yellow, protarsus with anterior face brown, meso- and metatarsi apically brown. Gaster dark green with dorsum mostly purple-black, first tergite mostly blue-green; ovipositor sheath brown.

Head in dorsal view about twice as broad as long; eyes separated by nearly 0.5 times breadth of head; POL 2.1 times OOL, ocellar triangle very slightly obtuse (about 95E), posterior ocellus separated from orbit by 1.6 times its diameter; vertex shiny with very weakly raised sculpture, hair-pits discernible. Head in front view (fig. 3) 1.25-1.30 times as broad as high; toruli below level of lower orbits; scrobes reaching to about two diameters of anterior ocellus, scrobal area moderately excavated with a low intertorular crest and weak, rounded parascrobal ridges. Antenna (fig. 4) with pedicel plus flagellum 1.4 times as long as breadth of head; scape as long as transverse diameter of eye, about five times as long as broad; pedicel 2.5 times as long as broad; anellus slightly longer than broad; funicle with F1 narrower than pedicel, more than 3 times as long as broad, F1 plus anellus slightly longer than pedicel; F2-7 progressively shorter and broader so that F7 is as broad as pedicel and about 1.4 times as long as broad; pilosity of funicle segments short and straight; sensilla difficult to see, in a single transverse row, 1 or 2 visible on each segment in lateral view.

Mesoscutum 1.8 times as broad as long, moderately shiny with relatively isodiametric (*cf. C. bolivari*, above), moderately raised wide-meshed reticulate sculpture; scutellum about as broad as long, its base about 4 times as broad as an axilla, with areoles of reticulate sculpture narrow and elongated. Mesopleuron shiny, mostly smooth with very weak reticulate sculpture. Mesotarsus with a double row of short, pale, ventral pegs on T1-4. Metacoxa (fig. 14) with femoral depression of outer face ill-defined and entirely pilose. Propodeum medially shorter than dorsellum and hardly as long as spiracle.

Forewing extending beyond apex of gaster; pilosity short, of rather even density anterior to cubital vein; ratio of lengths costal cell: marginal vein: stigmal vein: postmarginal vein as 25:26:5:6 (holotype); stigmal vein slightly curved, forming an angle of 45º with postmarginal vein.

Gaster 1.4 times length of mesosoma, in dorsal view 3.1 times as long as broad; post-cercal part of last tergite as long as, or slightly (1.1 times) longer than, broad; ovipositor sheath with apex protruding for a distance about 0.5 times post-cercal length of last tergite.

MALE. Unknown.

ETYMOLOGY. *Nitens* (Latin), shining. The name refers to the appearance of the weakly sculptured parts of the body, in particular the head and mesopleuron.

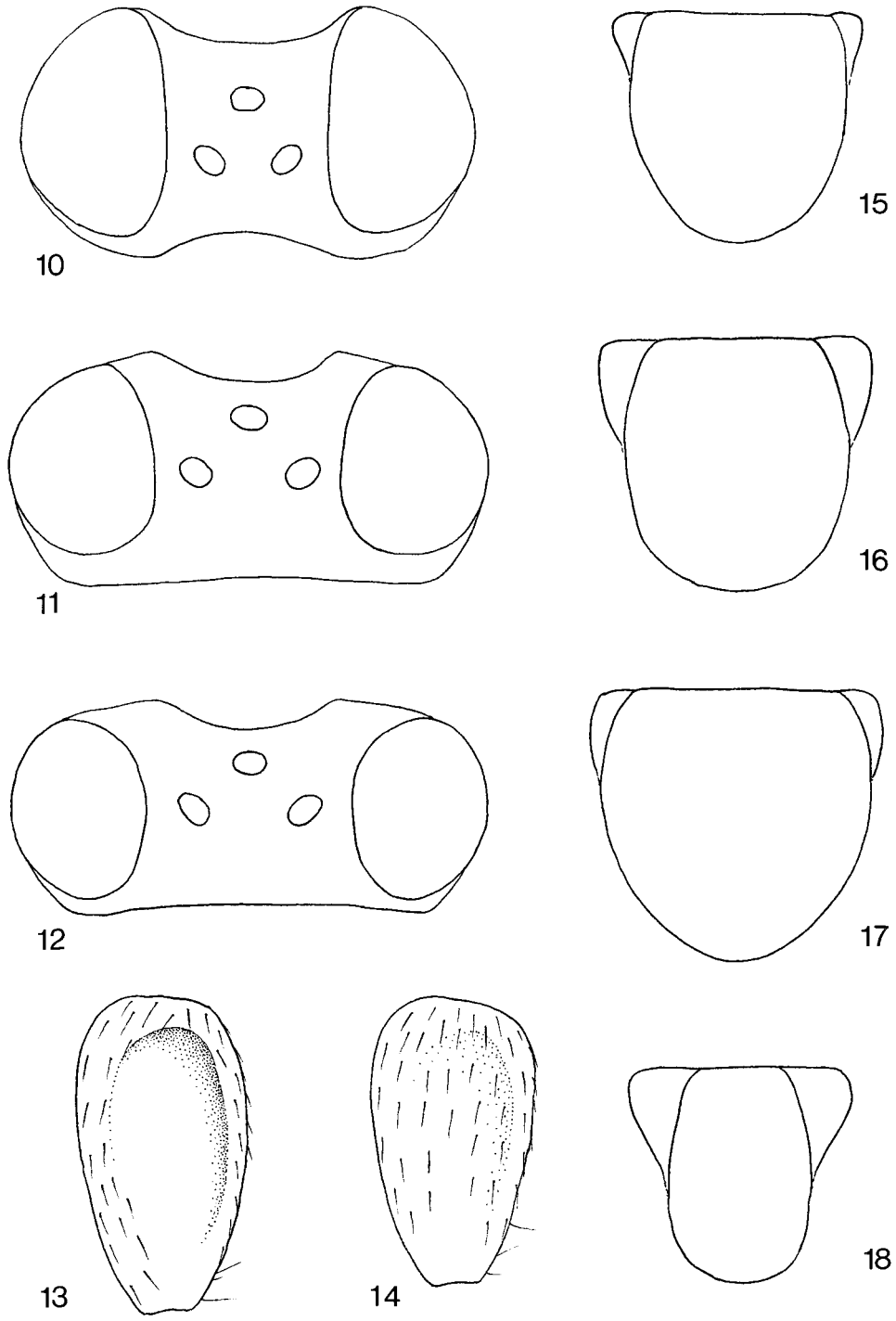
COMMENTS. *Calosota nitens*, like *C. bolivari* (described above), has relatively long antennae and a weakly sculptured, shiny head. The latter character distinguishes it from *C. aestivalis*, and the slightly obtuse ocellar triangle from both *C. aestivalis* and *C.bolivari*. *Calosota nitens* also differs from *C. aestivalis*, and indeed from all *Calosota* species known to us with the exception of *C. acron*, in having the femoral depression on the outer face of the metacoxa (fig. 14) poorly defined and completely pilose. Additional characters that distinguish *C. nitens* from *C. bolivari* are its more slender funicle, relatively longer marginal vein (more than 5 times as long as stigmal vein compared to 3 times as long in *C. bolivari)* and smaller body size.

Calosota obscura Ruschka, 1921

Calosota obscura Ruschka, 1921: 248-250
Calosota lixobia Erdös, 1946: 133-137 **syn. n.**

This species was recorded from Spain, province of Madrid, by Bolívar (1923b, 1929).

Calosota obscura is a species associated with hosts in stems of herbaceous plants. Six ♀♀ emerged in April, 2004 from *Onopordum corymbosum* stems collected in 2003 near Toledo (RRA); *Lixus* (Col., Curculionidae) and other beetles also emerged



Figs 10-18.— *Calosota* species ♀♀, 10-12, head in dorsal view: 10) *C. vernalis* Curtis (England); 11) *C. aestivalis* Curtis (England); 12) *C. obscura* Ruschka (France). 13-14, metacoxa outer face: 13) *C. bolivari* sp. nov. paratype; 14) *C. nitens* sp. nov. paratype. 15-18, scutellum and axillae: 15) *C. vernalis*; 16) *C. aestivalis*; 17) *C. obscura*; 18) *C. acron* (Walker) (England).

Figs 10-18.— Especies de *Calosota* ♀♀, 10-12, cabeza en vista dorsal: 10) *C. vernalis* Curtis (Inglaterra); 11) *C. aestivalis* Curtis (Inglaterra); 12) *C. obscura* Ruschka (Francia). 13-14, cara externa de la metacoxa: 13) paratipo de *C. bolivari* sp. nov.; 14) paratipo de *C. nitens* sp. nov.. 15-18, axila y escutelo: 15) *C. vernalis*; 16) *C. aestivalis*; 17) *C. obscura*; 18) *C. acron* (Walker) (Inglaterra).

from the stems. Several specimens have been reared from stems galled by aylacine Cynipidae. Material was obtained in Spain from stems of *Centaurea* sp. and *C. scabiosa* containing *Phanacis centaureae* Förster (Cuenca, 13 specimens; Madrid, 10 specimens), *Centaurea* sp. containing *Isocolus lichtensteini* (Mayr) (Madrid, 1 specimen), *Silybum marianum* containing *Aulacidea freesei* Nieves-Aldrey and/or *Phanacis zwoelferi* Nieves-Aldrey (Madrid, 2 specimens, Málaga, 7 specimens), *Urospermum picroides* containing *Timaspis urospermi* Kieffer (Málaga, 1 specimen) and *Tragopogon pratensis* containing *Aulacidea tragopogonis* (Thomson) (Madrid, 3 specimens). Coleoptera larvae were often found in the same stems and although beetles seem to be likelier hosts of *C. obscura* than gall wasps, the identity of the actual hosts remains undetermined.

Additionally, *C. obscura* has been recorded from Lleida (Tremp, 2003, RRA) and Zaragoza (reared from head of *Onopordum corymbosum*, Pina de Ebro, 1991, JBZ). Some of the males recorded from Zaragoza under *C. aestivalis* (Askew *et al.*, 2001) actually belong to *C. obscura*.

Calosota lixobia was reared in Hungary from *Onopordum* stems. Type material, including the lectotype, has been examined and found to belong to *C. obscura*.

Calosota vernalis Curtis, 1836

Calosota vernalis Curtis, 1836: 596
Calosoter aestivalis Walker, 1837: 359
Calosota aestivalis Curtis; Bolívar, 1923b: 63-65 (misidentification)

The nomenclatural confusion between the names *C. vernalis* and *C. aestivalis* is mentioned above under the latter. Bolívar (1923b, 1929) recorded *C. vernalis* (as *C. aestivalis*) from Madrid (Villaviciosa de Odón, several ♂♂ and ♀♀, M. M. de la Escalera), the material having been reared from *Rubus* stems containing aculeate nests attacked by *Trichodes* (Col., Cleridae). In a nest of *Pison atrum* Spinola (Hym., Sphecidae), a larva of *T. leucospideus* (Olivier) was observed in May with 17 minute ectoparasitic larvae. These completely consumed the *Trichodes* and emerged as adult *C. vernalis* (14 ♀♀, 3 ♂♂) six weeks later. Another brood of *C. vernalis* was reared from a nest of *Osmia* (Hym., Megachilidae) attacked by *Trichodes* sp. Three females from Sr. Escalera's rearings were seen in MNCN, where there are also other specimens from Madrid (El Pardo, 1 ♀ 1922, RGM and 1 ♀ 1991, JNA).

Calosota viridis Masi, 1922

Calosota (Paracalosota) viridis Masi, 1922: 142-144
Calosota matritensis Bolívar, 1929: 140-142 **syn. n.**
Calosota modesta Bolívar, 1929: 133-134 **syn. n.**
? *Calosota grylli* Erdös, 1955: 291

The type series of *C. matritensis* was collected by RGM in the province of Madrid at Chamartin (female holotype and male allotype, 21.vii.1923) and Vaciamadrid (7 ♀ ♀ paratypes). The holotype, allotype and six paratypes have been located in MNCN.

Calosota modesta is known only from the male holotype in MNCN: Madrid, Vaciamadrid, RGM. We consider it to be a specimen of *C. viridis* with unusually coarse mesoscutal sculpture and rather dark colouration.

Calosota grylli (paralectotype examined) may be synonymous with *C. viridis*. Erdös (1955) recognized the similarity between *C. matritensis* and *C. grylli*. However, the female of *C. grylli* was described as having a gaster twice as long as the mesosoma, which is longer than in any *C. viridis* (gaster 1.5-1.7 times as long as mesosoma) that we have seen. For this reason, although relative gaster length is variable (Erdös, 1955), we do not formally propose the synonymy. *Calosota viridis* is a parasitoid of *Tetramesa* species (Hym., Eurytomidae) in stems of Poaceae (Boucek, 1970), a host group which is attacked by other taxonomically difficult groups of chalcidoid parasitoids in the genera *Pediobius* and *Eurytoma*.

Calosota viridis is relatively numerous in Spain and was recorded (under *C. matritensis*) by Askew *et al.* (2001) from Zaragoza. Additional localities are El Ventorillo (A. Garrido), El Pardo (JNA), Montarco (Cabrera) and Vellon (RRA) in Madrid, and Calahonda (L. Lockey) in Granada.

Calosota sp. indet.

Three males of an undetermined species of *Calosota* were reported by Báez & Askew (1999) from the Canary Islands (Tenerife, Las Cañadas, 1 ♂ 2.x.1996, P. Oromi and 2 ♂♂ 1996, A. Camacho).

The long antennae (fig. 8) have distinctively petiolate funicle segments bearing long setae (see also couplet 10 of key above). No other species of *Calosota* has been recorded from the Canary Islands.

Eusandalum Ratzeburg, 1852

Stenocera Curtis, 1836 (preoccupied)
Polymoria Förster, 1856 (syn. Boucek, 1967)
Stenoceroides Dalla Torre, 1897

Boucek (1967) revised the palaearctic *Eusandalum* (previously better known under the name

Polymoria), recognizing fourteen species of which six are mentioned from Spain. Bolívar (1923a, 1926) described three of the latter, together with two others which have fallen in synonymy. A seventh Spanish species was reported by Askew *et al.* (2001).

Key to Spanish species of *Eusandalum* Ratzeburg

This key is largely adapted from Boucek (1967) and is mostly to females which are more easily distinguished; males of some species are unknown.

1 Forewing (both sexes) with irregular, infumate marks beyond basal cell. [Gaster of female rather more than twice as long as rest of body, last tergite linear, almost as long as metatibia, strongly laterally compressed with median dorsal carina sharp anteriorly but effaced posteriorly; pronotal collar offset by relatively strong transverse carina] ..... ***ibericum*** (Bolívar)

• Forewing not maculate, clear or more or less evenly yellowish to lightly infumate beyond basal cell 2

2(1) Female gaster short, about 1.15 times as long as rest of body with last tergite only slightly longer than its basal breadth, not laterally compressed, with a high median dorsal carina; stigmal vein hardly half as long as postmarginal vein; female flagellum not tapering to apex. [Small, about 4 mm. long or less; male unknown] .... ***walkeri*** (Curtis)

• Female gaster relatively longer, its last tergite laterally compressed and more than twice as long as broad without (*inerme*) or with a median dorsal carina; stigmal vein relatively longer; flagellum in both sexes distinctly tapering to apex.....3

3(2) Female gaster more than twice as long as mesosoma, its last tergite linear, variable in length but at least 0.85 times as long as metatibia; femora and tibiae without metallic colouration 4

• Female gaster less than twice as long as mesosoma, the last tergite at most 0.7 times as long as metatibia; femora and tibiae usually at least weakly metallic 5

4(3) Last tergite of female gaster with median dorsal carina indistinct, in profile its dorsal surface almost straight; wings with very sparse pilosity, female forewing clear or faintly yellowish; head in dorsal view 1.8 times as broad as long ..... ***inerme*** (Ratzeburg)

• Last tergite of female gaster with well-defined median dorsal carina, in profile its dorsal surface somewhat convex; wings with normal pilosity, female forewing with quite strong infumation; head in dorsal view 1.3-1.4 times as broad as long ..... ***seyrigi*** (Bolívar)

5(3) Head with frontal crest coarsely alveolate, only two vertical rows of alveolae between inner orbit and scrobes, the alveolae with rasp-like edges; wings clear, postmarginal vein of forewing not or hardly longer than stigmal vein; last tergite of female gaster just over half length of metatibia, in profile its dorsal surface moderately convex ..... ***merceti*** (Bolívar)

• Head with finer reticulation on frontal crests, at least three vertical rows of alveolae (*flavipenne*) but usually more between inner orbit and scrobes; wings clear or yellowish brown, postmarginal vein of forewing usually distinctly longer than stigmal vein [Note: venational characters are variable in these species, as discussed in detail by Boucek (1967)]; last tergite of female gaster 0.6-0.7 times as long as metatibia, in profile almost straight or strongly convex 6

6(5) Forewing clear with sparse and indistinct pilosity; stigmal vein thin, almost straight, the stigma not especially enlarged; frons with smooth inner face of crest excavated in two depressions, a large dorsal one and smaller ventral one just above a torulus; last tergite of female gaster with dorsal surface in profile almost straight .... ***coronatum*** (Thomson)

• Forewing with yellowish brown infumation, distinctly pilose; stigmal vein bent and thickened (variable); frons with inner face of crest not divided into two depressions; last tergite of female gaster with dorsal surface in profile strongly convex .... ***flavipenne*** Ruschka

Eusandalum coronatum (Thomson, 1876)

Polymoria coronata Thomson, 1876: 111
Polymoria gomezi Bolívar, 1926: 373 (syn. Boucek, 1967)
Polymoria segurensis Bolívar, 1926: 369 (syn. Boucek, 1967)

The male holotype of *P. gomezi* from Madrid, Paracuellos de Jarama, 28.v.1924 (G. Menor) in MNCN differs from typical *E. coronatum* in not having the postmarginal vein longer than the stigmal vein, as pointed out and figured by Boucek (1967), but in other respects (sculpture of thorax, wing pilosity, form of head) it agrees with *E. coronatum* and we accept Boucek's synonymy.

The female holotype of *P. segurensis* from Albacete, El Pardal, Sierra de Segura, vi.1903 (M. M. de la Escalera) in MNCN is dismembered and only the head, front legs, left forewing and distal part of an antenna remain. It is labelled in Bolívar's handwriting 'Polymoria segurensis ♀ TIPO C. Bol.' Another intact female in MNCN from Avila, Pinares Llanos de Caja (C. Bolívar y Pieltain ?) appears to be conspecific with the holotype of *P. segurensis*, differing only in its larger size and relatively longer marginal vein. Boucek (1967: 290) incorrectly gave data of the Avila specimen as that of the holotype, but it is clear from his account that he based his synonymy of *P. segurensis* under *E. coronatum* upon the actual holotype of *P. segurensis*. We accept Boucek's synonymy.

Bolívar (1926) recorded *Polymoria coronata* from Avila (1♀ and 2♂♂, the female referred to above), Madrid (1♂) and Segovia (1♀). All the

specimens are in MNCN. Askew *et al.* (2001) recorded 1♀ from Zaragoza. The Avila, Segovia and Zaragoza material was all obtained from wood of *Pinus* spp. with *Anthaxia* spp. (Buprestidae) and *Magdalis* spp. (Curculionidae) (Coleoptera) as possible hosts.

Eusandalum flavipenne Ruschka, 1921
Eusandalum flavipenne Ruschka, 1921: 257

Eusandalum flavipenne was recorded by Boucek (1967) from Spain, Segovia, San Ildefonso (La Granja), 22.ix.1902 (Granger) on the basis of material in the Museum National d'Histoire Naturelle in Paris.

Eusandalum ibericum (Bolívar, 1923)
Polymoria iberica Bolívar, 1923a: 21

Bolívar (1923a) described *P. iberica* from two females (holotype, paratype) from Spain, Cordóba, Villanueva de Cordóba, reared from branches of *Quercus ilex* attacked by *Coraebus fasciatus* Villers (Col., Buprestidae) and other insects. The male was described later (Bolívar, 1926) from one specimen reared with another female from *Q. ilex* attacked by *Acmaeodera adspersula* (Illiger) (Col., Buprestidae) in Cordóba, Peñarroya (A. Seyrig). The holotype, paratype and the male from Peñarroya were located in MNCN. Another female was reported from Zaragoza (Askew *et al.*, 2001), reared from branches of *Genista*. So far as is known, *E. ibericum* occurs only in Iberia.

Eusandalum inerme (Ratzeburg, 1848)
Eupelmus inermis Ratzeburg, 1848: 152
Eusandalum inerme (Ratzeburg); Ratzeburg, 1852: 200

This species was recorded from Spain (Zaragoza, Pina de Ebro, 3♂♂) by Askew *et al.* (2001). Further findings are a female from Madrid, El Ventorillo, 1480 m., Malaise trap, 1-9.viii.1988 (JNA) and a male from Granada, Sierra Nevada, 22.vii.1974 (RRA).

Eusandalum merceti (Bolívar, 1926)
Polymoria merceti Bolívar, 1926: 371-373

This species was described from Spain but subsequently has been found across southern Europe and as far east as Tadjikistan. The holotype female from Madrid, El Pardo (RGM) in MNCN was labelled by Bolívar as 'Polymoria merceti C. Bol. ♀ TIPO' and 'Madrid insectario, ex *Eccoptogaster multistriatus*, *Ulmus campestris*'. This host is now known as *Scolytus multistriatus* Marsham (Col., Scolytidae). A male from Madrid, Vaciamadrid (RGM) is also mentioned by Bolívar (1926) and is in MNCN.

Eusandalum merceti was recorded from Zaragoza, Pina de Ebro (JBZ) by Askew *et al.* (2001) and has been found in Lleida, Sta Engracia near Tremp, on *Quercus ilex*, 8.vii.2003 (RRA). *Eusandalum merceti* is also known from the Canary Islands: 1♂ Tenerife, Las Cañadas, 1996 (N. Zurita) (recorded as *Eusandalum* sp. by Báez & Askew (1999)); 1♂ La Palma, Parque Nacional de la Caldera de Taburiente, 2.vi.2000 (T. Domingo Quero).

Eusandalum seyrigi (Bolívar, 1926)
Polymoria seyrigi Bolívar, 1926: 374-376

The holotype female was reared as a parasitoid of a larva of *Acmaeodera adspersula* (Col., Buprestidae) in twigs of *Quercus ilex* from Córdoba, Peñarroya (A. Seyrig). In MNCN there is a pin with appropriate labelling for the holotype, but no specimen; the holotype has presumably been lost. One female was recorded by Askew *et al.* (2001) from Zaragoza, Pina de Ebro, colour tray, 21.vii.1991 (JBZ). Boucek (1967) reported the species from France.

Eusandalum walkeri (Curtis, 1836)
Stenocera walkeri Curtis, 1836: 596
Stenoceroides walkeri (Curtis); Dalla Torre, 1897: 269

The only record of this species from Iberia is by Boucek (1967) who listed Spain: [Valencia], Monserrat, 25.vii.1930 (leg. Novicky), 1♀.

Pentacladia Westwood, 1835
Chirolophus Haliday, 1862

Delvare (2001) provided a recent revision of this genus, recognizing six species, only one of which is known to occur in Europe. However three others are North African and may possibly extend into Iberia.

Species of *Pentacladia* have been reared from wood attacked by xylophagous Coleoptera, and especially Buprestidae (notably species of *Acmaeodera*, *Anthaxia* and *Meliboeus*), thus pro-

bably being associated with the same group of hosts attacked by the allied genus *Eusandalum* (Delvare 2001). Mateu (1972) described *P. eques* (Haliday), a species found in North Africa and the Middle East, as being a solitary ectoparasitoid of larvae of Buprestidae in *Acacia*.

Pentacladia elegans Westwood, 1835

Pentacladia elegans Westwood, 1835: 38, 70
Chirolophus halidayi Walker, 1873: 399 (syn. Delvare, 2001)
Chirolophus incertus Masi, 1923: 9-11 (syn. Delvare, 2001)

Eleven males and one female *P. elegans* were recorded, as *Chirolophus incertus*, by Askew *et al.* (2001) from Spain: Zaragoza, 1991-1994 (JBZ). Delvare (2001) cited the species from Almeria, 2000 and Tarragona, 1990 (both H. Tussac). From data on specimens in MNCN, Córdoba, Cuenca and Madrid can be included in the known distribution of *P. elegans*, and ZMAN houses material from Alicante, Almeria, Cádiz, Cuenca, Granada, Murcia and Soria, almost all collected by M. J. Gijswijt.

No host is yet known, but Delvare (2001) reported observing female *P. elegans* in the south of Spain on dead branches of an almond-tree with exit holes of beetles. Of the 27 specimens from Spain that we have been able to examine, only four are females; Delvare (2001) observed that searching females examine only the shaded side of branches and may be partly nocturnal.

NEANASTATINAE (= METAPELMATINAE)

Gibson (1993) synonymized Neanastatinae Kalina and Metapelmatinae Boucek. Of the four known genera, two occur in both the Iberian Peninsula and the Canary Islands.

Metapelma Westwood, 1835

Metapelma nobile (Förster, 1860)

Halidea nobilis Förster, 1860: 115

Metapelma nobile was previously recorded by Báez & Askew (1999) from the Canary Islands (1 ♀ Tenerife, Las Cañadas, Malaise trap, 1996, N. Zurita).

New record for Spain: 1 ♀, Madrid, El Ventorillo, 1480m., Malaise trap, 22-30.vi.1989, JNA (MNCN). This specimen bears a G. Gibson determination label.

Neanastatus Ferrière, 1938

Neanastatus turneri Ferrière, 1938

Neanastatus turneri Ferrière, 1938: 65-66

This represents a new record for peninsular Spain. The following material, all collected by M. J. Gijswijt in Almeria and now in ZMAN, has been seen: Cuevas del Almanzora, 13.iv.1994, 1 ♀; Villaricos, Sierra de Almagrera, 11.v.1992, 1 ♀, 25.iii.1995, 1 ♂, and 19.iv.1995, 1 ♂ 1 ♀. The species is locally common in the Canary Islands where it has been recorded from Gran Canaria (Gijswijt, 1990), La Palma (Koponen & Askew, 2002) and Tenerife (Gijswijt, 1990). In addition, 2 ♀ ♀ have been seen from Fuerteventura, Corralejo, Las Dunas, 4-13.iii.1990, A. C. & W. N. Ellis (ZMAN).

Neanastatus turneri is a parasitoid of Cecidomyiidae (Dipt.) and has been reared from galls of *Asphondylia punica* Marchal on *Atriplex halimum* in Cyprus (M. Boness).

EUPELMINAE (supplementary note)

Brasema Cameron, 1884

New data on *Brasema*, in addition to that included in Askew & Nieves-Aldrey (2004), is presented below.

Brasema stenus (Boucek, 1968) **comb. n.**

Eupelmus insignis sensu Erdös, 1957: 365-366, nec Förster, 1860
Eupelmus stenus Boucek, 1968: 239
Brasema ephedricola Askew, 1998: 814-815 **syn. n.**

Brasema stenus has previously been reported only from Hungary and Slovakia. We reared 17 ♂ ♂ and 14 ♀ ♀ from previous year stems of *Centaurea* sp. collected 9.v.2004 at Gascones (Madrid). The stems contained plentiful galls of *Phanacis centaureae* (Hym., Cynipidae), and this gall-wasp is the presumed host. Interestingly, the Hungarian material of 'Eupelmus insignis' studied by Erdös (1957) included 3 ♀ ♀ reared from *Centaurea*.

The Spanish specimens agree closely with Erdös' (1957) description of what he called *Eupelmus insignis* Förster, and also with material in the Hungarian Natural History Museum (Budapest) identified by Erdös as *E. insignis*.

Brasema ephedricola Askew was described in Askew & Blasco-Zumeta (1998) from specimens reared from galls of *Eurytoma gallephedrae* Askew

(Hym., Eurytomidae) growing on *Ephedra* in Zaragoza. These are larger, darker and more strongly sculptured than the parasitoids of *Phanacis centaureae*, but we believe them to be conspecific, even though their known hosts are very different. Eupelminae are often extremely polyphagous.

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